Capabilities

Trials can be run with different extruder/spinneret configurations with PP, PA, PE and PET; other materials are possible but need to be qualified in.

Rheology	**Temperature** [C]	**Dies**	**Options**
Smart Rheo	50-450	1mm 30:1 ; 1mm 20:1 1mm 5:1 ; 0.5mm 20:1	- 2 Load Cells Capacity: 20 kN - 100-10,000/s
MVR	50-400	2.095mm ID x 8mm 1.045mm ID x 4mm	- ASTM D-1238 A/B/C Methods - ISO 1133 - 2.16 Kg & 5 Kg

Hill's LBS 300 Configuration	**Capillaries**	**Fiber cross section [Bico]**	**Through put range PP** [g/h/min]	**Line speed** [m/min]	**Micron Per fil** [micron]
Bico-Monofilament	1	Round/Hollow/ Homo-component/ Sheath-Core/ Side-by-Side/ 37 Islands/ 16 SegPie/	0.17-20	50-750	75-750
Bico - Multifilament	36, 48, 72	Round/Hollow/ Sheath-Core/ Side-by-Side/ 36 Islands/ 16 SegPie/	0.1-1.2	50-2000	15-50
Mini Spunbond (2")	36, 48, 72		0.1-1.2	1-10	15-50
Mini Meltblown (4")	25 HPI S/C, 100 HPI S/S submicron or Nano	Sheath Core or Side-by-Side	0.1-1.2	1-10	0.1-10

Meltblowning Configuration	**Spinneret** [Type]	**Die Tip Capillaries** [Number/m]	**Capillary size** [Microns]	**Die Tip Capillaries** Count
15" Biax Labline or MCE	4 Rows	2000	230	736 or 244
15" Biax Labline or MCE	2 Rows	1000	510	368 or 122
6"Multi-configuration Extruders (MCE)	Biax – 6 Rows	3000	380	366
	Biax – 10 Rows	6500	380	810
Web/fabric Configuration	**Throughput range PP** [kg/h/m]	**Basis weight range** [g/m²]	**Line speed** [m/min]	**Fabric Width** [den]
15" Biax Labline	0.3 - 3.0	1-200	1.5-150	**38 cm Biax**
6" MCE	0.1 - 1.0	1-100	1.5-150	**12.5cm Biax**

Melt Bonding Configuration	Width [meter]	Temp [C]	Line speed [m/min]	Add-on [g]	Pressure [BAR]
Powder Coating (Klieverik)	0.10-0.80	<240	1-10	5-200gsm	1-6
Belt over Drum (Klieverik)	Up to 0.80	<240	1-10	NA	1-6
Heat Press	0.5 x 0.5m	<240	-		600

Compounding & Pelletizing	Screw Diameter [mm]	Temp [C]	Screw Speed [rev/min]	Feed System	Strand Pelletizing Group
Leistritz ZSE-18HPe Twin-Screw Extruder	17.8	<350	<1200	3-Component K-Tron Gravimetric	Water Bath Air cooling Belt Strand Pelletizer

Micro-Compounder Mini Batch Mixing	Mixing Volume [cc]	Temp [C]	Screw Speed [rev/min]	Other Specifications
Daca Instruments Micro-compounder	4.5	<400	<360	Twin Conical Screws Load and Torque Measuring Capabilities

Warranties

Due to the nature of research and equipment, NWI provides no guarantees or warranties as to the outcome of trials.

Resins

Before we can schedule a trial, we will need:

- Specifics of the resin, as clearly as possible (e.g. polypropylene, homo-polymer, MFR, PI - relative to standard grades, catalyst, co-monomers) and any details of prior experiments with such materials.
- All MSDS, SDS, and other relevant information should be submitted to NWI at least two weeks prior to the scheduled trial.
- The melt characteristics of all polymers and additives must be received at least one week before the trial. These include T_m, T_g, viscosity, melt flow index, melt rheology and processing conditions including drying temperatures and conditions, temperatures, throughput rates, basis weight, and other characteristics of the webs. University's Analytical labs can determine these characteristics for our normal fees for such a service.
- If NWI is required to characterize the polymers, the materials must be received at least t**wo weeks** prior to the trial.

Shipping address for resins and additives

Attn. Christopher Atack
The Nonwovens Institute
Fiber Science
1010 Main Campus Drive
Suite 150
Raleigh, NC 27606

Prior to the shipment of any resin, you must notify NWI. All relevant information about the materials shipped, and the associated trial plans must be sent to:

Attn. Christopher Atack
Email: csatack@ncsu.edu
Mobile: 910-477-0115

Shipments can be received Monday to Friday from 8:00 AM to 4:00 PM.

Please indicate on delivery papers your company's name and please make sure that the shipment is addressed to Christopher Atack. We cannot guarantee that your material is marked properly and available for your trials. Unidentified resins can be stored only for two (2) weeks and then will be discarded at clients' expense.

Please allow sufficient time for the shipment, especially if custom clearance is required. Generally, resins must be supplied at least two weeks ahead of the trial by the customer. Resins cannot be stored in our warehouse.

The resins must be:

- Used at NWI pilot facilities
- Discarded on client's behalf at client's cost
- Returned to client at client's cost

NWI reserves the right to dispose of any material after a period of two weeks following the trials, in the absence of any other agreements.

Resin Service

Prior arrangements must be made if NWI is to supply the base polymers or fibers for trials at least four (4) weeks prior to the trial. This prior notice ensures that the materials are delivered and ready in time for your trial.

Additional Hours and Charges

NWI is open from 8:00 AM to 5:00 PM, and NWI staff normally work eight (8) hour days (plus one hour for lunch). Clients will be charged time and one-half (1½) for hours worked on trials by NWI staff in excess of eight hours on a particular day.

Operational Considerations

- A detailed trial plan must be developed in discussion with the responsible engineer from NWI at least one (1) week prior to trials. Without such a plan, the trial will be canceled.
- Minimum run time is one (1) day

Participation in Trials

If the client wishes to be present at the trial, NWI must be notified in advance and provided with the names and contact information of all individuals who will attend. **All participants must sign the visitor waiver agreement (Appendix D) and review a safety video before the trial start**; NWI must receive all signed visitor waiver agreements before the start of the trial, otherwise the client and its employees will not be allowed to be participate in the trial. Please keep in mind that you are visiting a research and pilot facility. You must therefore, comply with all safety rules while on the premises.

NWI personnel will perform all trial work. Client's employees can be present during the trial, but are required to stay within approved safe zones or in the office away from the equipment. All safety guidelines must be followed by the Client's employees while in the pilot facility.

NWI staff will prepare the spinpacks required for the trial. Client's employees cannot be present during this stage of the trial. The details of the equipment and the spin packs are confidential and will not be disclosed under any circumstances.

Non-Analysis

Except as specified by Client and agreed to by NWI, NWI will not perform or permit others to perform any additional test, analysis, or other evaluation of the material for the purpose of determining the chemical character, components, or physical characteristics or the method of manufacture thereof. NWI will not share samples, or any portion thereof, with any third party, without the express permission of Client.

At Client's request, NWI can provide some basic measurements of denier, basis weight, air permeability and tensile strength as needed for the trials. Additional costs will apply for additional tests. NWI must be notified in advance for any special tests to be performed during the trial so that arrangements can be made with NWI analytical facilities.

Data

NWI will provide a basic report for the trial two weeks after the trial completion. This report will include run sheets for the trial and any tests performed.

Payment Terms:

- Charges will be in accordance with the Service Agreement (Order Form), Bylaws and if applicable, the Membership Agreement.
- NWI will not exceed the payment amount agreed to in the Order Form without written authorization from the Client.
- Fourteen (14) days before the scheduled trial, the Client's Purchase Order covering the trial must be on file at NWI.
- Invoices will be sent typically one week after trials.
- Final payment is required within 30 days of receipt of invoice from NWI.

General Considerations

- Violations of the procedures outlined herein may result in NWI's cancellation of the trial.
- Photographing, recording, or drawing sketches of any machinery or equipment and related processes at NWI Facilities is strictly prohibited.
- NWI reserves the right to conduct tours of all Lab Facilities unless a Client's proprietary information could be detected or discovered by those touring the Facilities. NWI must be notified of Client proprietary information in writing prior to the trial and NWI shall comply with the confidentiality obligations as set out in the fabrication services agreement.
- Any samples remaining after trial will be sent via Fedex Collect unless otherwise arranged. Left over materials contribute to an unsafe work environment

Costs

Costs depend on line configuration and are as shown below:

Line configuration/Options	$/day* NWI Member	$/day* Others
Spunmelt Webs		
Bi-component Meltblowing/Spunbond Hills LBS 330	2,800	3,500
Bi-component Mini Meltblowing/Spunbond Hills LBS 300	2,100	2,750
15” Biax Meltblowing	3,500	4,375
Dual Beam Meltblowing (15” over 15”)	5,500	7,000
Coform Meltblowing (15” Biax + Muratex Shaker+KC Meltblown Die)	5,500	7,000
Set up/clean up Fee	280/Per trial	350/Per trial
Filaments		
Bi-component Filament Spinning	2,100	2,750
Filament Drawing	700	875
Set up/clean up Fee	280/Per trial	350/Per trial
Compounding & Pelletizing		
Compounding & Pelletizing - Leistritz ZSE-18HPe Twin-Screw Extruder	….	….
Set up/clean up Fee	280/Per trial	350/Per trial
Micro-Compounding - Daca Instruments	….	….
Set up/clean up Fee	…./Per trial	…./Per trial
Bonding		
Klieverik Powder/Lamination Coating	2,600	3,700
Heat Press	1,000	1,250
Set up/clean up Fee	250/Per trial	300/Per trial
Add-Ons		
Knit Sock of Filament Samples	650	800
Rheology	1,000	1,250

***** Trial day working time is: Monday to Friday 8:30 AM to 3:30 PM; warm-up and shut-down not included. Additional time will be charged at time and a half

The following costs will be added to the final balance where applicable:

Item	Costs
Raw Materials Cost (including purge polymer)	Cost + 20% for admin and handling
Expendables (Boxes, tubes, etc.	Cost + 20% for admin and handling
Project Management (if requested)	$1500 per consultation per day
Overtime (if requested)	1.5 times the applicable hourly rate
Shipping, packing, customs clearance if provided by NWI	Actual - Shipment will be “prepaid” and added to the invoice unless otherwise specified by Client
Storage if prior arrangement is made	Actual
Disposal management for resins other than PP	$500
Equipment damage or costs due to incorrect technical information or materials supplied	Actual

Cancellation fees are as shown below:

- 15 days and longer: no charge
- 8 to 14 days: 50% of trial costs
- One week or less: 75% of trial costs

All visitors must follow instructions below:

	Stay in the area (ground floor) of pilot facility where your trial is in progress, and public areas.
	Smoking is prohibited within the building and restricted to marked areas outside the building.
	Taking photos, films (usage of mobile phones with cameras), etc. is strictly prohibited.
	Use earplugs (you can obtain disposable earplugs from NWI). Use helmets during erection works. Helmets are available on request.
	Be careful at site of the lab lines. These are working areas: cranes may be used over your head, forklifts are moving material such as resin and machine parts
	Lab and workshop can only be visited / used together with NWI staff ONLY. No ties/scarfs can be worn while on NWI premises. Appropriate clothing and footwear are needed.
	All information you get from our site, as well as all visible information are proprietary and confidential information – any usage of such information is strictly prohibited.

Company	
Name	
Date	
Signature	

Appendix D – Visitor Participation Agreement

Visitor has requested permission to be present on the North Carolina State University ("NC State") campus and to visit the NWI Fiber Science Research Facilities ("Facility"). As part of the visit, Visitor will oversee a trial at the Facility (the "activity" herein).

Visitor acknowledges that their presence and participation in the activity at the Facility is for their own personal benefit. Visitor acknowledges that they have voluntarily elected to participate the activity at the Facility, and desires to do so at their own risk. Visitor further agrees to assume responsibility for all damages, losses, and personal injury to others that is partially or completely due to their fault

While at NC State, Visitor understands that they are subject to and will follow all NC State policies, rules and regulations, including those concerning (a) conduct, (b) use of the Facility, (c) environmental safety and health, and (d) intellectual property. There is a safety plan for the Facility, as well as safety instructions, which Visitor agrees to review prior to participating in the activity.

Visitor acknowledges that there are potential risks of injury and even death from participating in the activity at the Facility. Furthermore, Visitor will be responsible for the proper care of all equipment and property used by or entrusted to them. In consideration for being allowed by NC State to use its Facility and participate in the activity, Visitor agrees to assume responsibility for all risks to themselves and their property, and agrees to indemnify and hold harmless NC State, its trustees, officers, employees, and agents from any and all negligence, claims, damages, and liability arising from or related to the Visitor's activities at the university. Visitor further agrees to accept and assume for themselves, their assigns, executors, and heirs any and all such risks and losses that may occur.

This agreement is given freely in exchange for the valuable learning experience. Visitor acknowledges that they have read and agree to the terms of this Agreement, and understands that this agreement is given in consideration for their participation in the activity.

Visitor Name: _____
[Printed name]

Visitor Signature: _____ Date: _____

Visitor Name: _____
[Printed name]

Visitor Signature: _____ Date: _____

Visitor Name: _____
[Printed name]

Visitor Signature: _____ Date: _____